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The Origin of Stipules in Liriodendron

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(WITH PLATES 41, 42)

In 1894 Dr. Arthur Hollick described * a species of *Liriodendron* from the Laramie formation at Walsenberg, Colorado, under the name of *Liriodendron alatum*, a manuscript name given the specimen by the late Professor J. S. Newberry. It was a large leaf, oblong in outline, with a deeply emarginate apex, and had conspicuously winged petioles. In the same paper a form of *Liriophyllum populoides* Lesq. was described from the Dakota formation, with similarly winged petioles; and Dr. Hollick was led to suggest from these two instances that the large fugacious stipules of our living tulip-tree might represent former leaf-lobes, which, becoming separated, formed basilar lobes, then winged petioles, and finally the modern stipules.

In a subsequent paper † he describes two specimens of leaves of *Liriodendron Tulipifera* Linn., which serve, in a measure, to substantiate this view although it was sharply assailed by Theo. Holm in the Botanical Gazette.‡

Somewhat similar petiolar appendages in the genus *Platanus* have been ably discussed by Professor Lester F. Ward in several papers,§ and his conclusion that the large foliar stipules of the

* Bull. Torr. Club, **21**: 467–471. *pl. 220, 221.* 1894.

† Ibid., **23**: 249, 250. *pl. 269, 270.* 1896.

‡ Bot. Gazette, **20**: 312. 1895.

§ Palaeontologic Hist. of the Genus *Platanus*, Proc. U. S. Nat. Mus. **11**: 39–42. *pl. 17–22.* 1888. Origin of Plane Trees, Am. Nat. **24**: 797–810. *pl. 28.* 1890.

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modern tree represent the final stage in development from the basilar leaf-lobes of the Cretaceous species, is amply proven, although questioned in some quarters.* Still another instance where stipules are mentioned as developing from leaf-lobes is implied in the following footnote on page 420 of The Smilaceae of North and Central America. In speaking of those species which climb by means of tendrils growing from the stipular wings on each side of the petiole, Dr. Morong says: "De Candolle regards this appendage as more in the nature of a modified leaf segment or leaflet than a stipule, but it seems to me that a stipule is nothing else than a leaflet at the base of the petiole."† The only other mention of winged petioles in *Liriodendron* so far as I am aware, is a short communication to Meehan's Monthly for August, 1896 (p. 145), from Mrs. W. A. Kellerman recording her observation of several forms with adnate stipules.

The writer has been fortunate in securing a large series of specimens of *Liriodendron Tulipifera* Linn. with winged petioles and adnate stipules in all stages of development, all of which strikingly confirm Dr. Hollick's theory of their origin. We have noted them briefly in the following pages in what seem to be the natural stages of their development as exhibited by our material.

We are greatly indebted to Mrs. W. A. Kellerman, of Columbus, Ohio, for many fine specimens. The first suggestion of basilar lobes is found in an obtusely lobed leaf of the normal size from a sapling. The leaf-blade is extended on each side at the base to form more or less well-defined lobes nearly the size of an ordinary stipule, and strikingly like them in venation, attracting attention at a glance; this is particularly true of the right-hand lobe which is entirely stipular in venation, quite different from the usual venation of the basilar portion of ordinary leaves. These lobes are well shown in Plate 41, Fig. 1. This form undoubtedly represents the first stage the ancestral leaf, or at least its basal portion, assumed in the course of stipular development. We find what we consider analogous basilar lobes or ears in two

* Ward's conclusions are rejected by A. G. Nathorst, Rev. of Types of Laramei Flora by L. F. Ward, in Neues Jahrbuch für Mineralogie, **2**: 219–222. 1893.

† Morong, Bull. Torr. Club, **21**: 420, footnote. 1894.

existing species of *Magnolia* from our Southern States, *Magnolia Fraseri* Walt. and *Magnolia macrophylla* Michx. and among ancient species they occur in *Magnolia auriculata* Newb., which is a rather common species in the Amboy Clays of New Jersey and which exhibits almost every stage from leaves with a truncate base to those with an extremely lobed base. We find these forms of especial interest because of the close relationship between *Magnolia* and *Liriodendron*. The leaf figured on Plate 41, Fig. 9 represents the second stage of the series five-eighths natural size. It is a very remarkable specimen, both in shape and venation. Nearly triangular in outline, with an acute base, it bears upon the petiole immediately below the base of the blade, but entirely separated from it, a pair of appendages * shaped like flasks with crooked necks (irregularly umbonate). The upper portion of the appendages overlaps the basilar portion of the leaf, and like it they are very coriaceous, thus differing widely from the thin parenchyma of ordinary stipules. The length of the petiole below the appendages is one and seven-eighths inches, showing that they are true leaf segments and not of stipular origin.

On Plate 42, Fig. 1, is pictured a leaf which was borne on a shoot from an old stump; it is an inverted triangle in rough outline with a truncate apex four and three-quarter inches in width, and tapers to a narrow base: the petiole is short and broadly winged: these wings are continuous with the blade, there being simply a contraction on one side, while on the other side there is a sharp sinus which extends to within one-sixteenth of an inch of the petiole, leaving room however for a plainly marked vein which passes from one to the other: the wings are exactly similar to the blade proper in texture and extend to the base of the petiole, encircling the stem as do true stipules; the right hand wing is the larger of the two and bears a mucronate point at its apex exactly like a true stipule. While the latter might possibly be considered by some as an adnate stipule, the left-hand wing can hardly be considered other than as a winged margin of the petiole in the act of becoming stipular, and rather closely resembles *Liriodendron alatum* Newb. from the Laramie.

* The left hand one is broken off in the specimen, but the scar where it was attached is plainly shown.

In the specimen figured on Plate 41, Fig. 2, we have a much smaller leaf, somewhat suggestive of a *Liriophyllum* in outline; the blade is two-lobed at the top, with an emarginate apex, and is constricted at its middle to form two large petiolar wings which encircle the stem and coalesce at the point marked *A*, forming a loose tube. These wings are very large, nearly equalling the leaf-blade proper in size, and the nervation of each extends into the other, as is well shown on Plate 42, Fig. 6, which represents the tube slit open and spread out flat; it will be noticed that one of the primary veins takes its origin in the right-hand wing, a significant fact, showing that if we are to consider these wings as stipular, then we are obliged to consider the leaf-blade proper in this case as an appendage of these stipules which is manifestly not the case, the only alternative being to consider the wings as separated segments of the leaf-blade.

On Plate 41, Fig. 5, we have a larger leaf in a slightly more advanced stage of stipular evolution; the blade proper has a retuse apex, and strongly resembles certain leaves referred to *Liriodendron primaevum* Newb. from the Dakota formation and to *Liriodendron simplex* Newb. from the Amboy Clays. A wide, rounded sinus separates the blade proper from the wings of the petiole, which latter nearly equal the blade proper in size and are continuous with it by means of a narrow margin on each side of the petiole.

Plate 41, Fig. 10, shows a small oblong-cuneate leaf in about the same stage of stipular development as the preceding. The general shape is that of *Liriophyllum obcordatum* Lesq. and the petiole is narrowly winged throughout its whole length; the left-hand margin expands suddenly at a point about half way to the base of the petiole to form a stipule-like wing, while the right-hand margin enlarges gradually until at its base it is about three times as wide as it is at its narrowest part.

Plate 42, Fig. 2, of a much larger leaf, shows us the next step in the chain, with somewhat reduced wings which have become entirely separated from the blade by an interval of petiole which is one-half of an inch long on the right side and five-eighths of an inch long on the left side; the finer venation of the wings is somewhat transverse in its general direction, rather than longi-

tudinal, the usual manner; the union of the wings with the petiole forms an angle of about 90°.

On Plate 42, Fig. 9, we have a slightly more advanced stage than that shown on Plate 42, Fig. 2; the leaf shows traces of lobation and the wings are more like stipules both in shape and venation, and are more separated from the petiole, the angle formed by the union with the latter being about 45°.

In the form shown on Plate 41, Fig. 6, we have the closely succeeding stage in the series. The wings are very broad, being fully as wide as the blade proper. This form resembles Plate 41, Fig. 5, in the outline of its blade, while the wings are but slightly removed from the preceding, being a trifle freer from the petiole.

We place as the next stage in the series Fig. 5 on plate 42, for although the petiole is much lengthened and the wings are considerably reduced, still they are attached to the petiole for over half of their length. Fig. 8, plate 41, closely follows the preceding. While the leaf-blade is of a different shape, the petiole is of similar length and its appendages are similar in size and form; the only difference being that they are free for more than half their length, approaching the next stage in their degree of attachment.

On plate 41, Fig. 7, we have a somewhat more advanced stage; the blade proper is orbicular in general outline with a slightly emarginate apex, exactly similar to dozens of leaves which may be found on young shoots; the distance from the blade to the wings is comparatively great (one and one-quarter inches), almost the same as the length of the blade; wings are attached to the petiole by their bases only and are widely divergent; they are somewhat larger than in the preceding form. From this to the regular modern stipulate form, it is but a step, which interval we bridge over with the form shown on Plate 41, Fig. 3. At first glance the stipules appear entirely free, but closer examination shows that they still retain their connection with the petiole by means of a small triangle of connective tissue (shown enlarged at Fig. 4, Plate 41).

The modern form of stipules is shown in Figs. 3, and 8, on Plate 42, Fig. 3 being the small form the leaf assumes on young shoots and saplings, and Fig. 8 that of the normal modern form of leaf.

In the growth of young and vigorous shoots in the spring time, where there is excessive, or at least a full supply of nourishment, and where the necessity of protecting the unfolding leaflets is more imperative, comparatively immense stipules usually occur; one of these (nat. size) is figured on Plate 42, Fig. 4, in order to show its venation.

Still another form sometimes assumed by stipules is shown in Fig. 7, on Plate 42, reminding one of the curious stipular appendages on some of our magnolias. All degrees of coalescence occur from forms barely united to those united for about half their length like the one figured; we have specimens one-third larger than this.

Figs. 10 and 11 on Plate 42, show the curious stipular forms which occur on *Magnolia obovata* Thunb. and *Magnolia conspicua* Salisb. the only two species which I have had an opportunity of observing. They form large bud scales, affording effective protection for the tender unfolding leaves. In the youngest shown (Fig. 10), they are many times the size of the tiny leaflet they bear, while Fig. 11 shows a larger leaflet.

On comparing this form with those forms of adnate *Liriodendron* stipules shown on Plate 42, Fig. 7, it will be seen that the addition of a petiole with a small leaflet at its summit would make them identical with the magnolia specimen, the venation too is almost identical, that in *Magnolia* being somewhat finer and more reticulate; as the *Magnolia* leaves become older the wings separate along the petiole and fall off. These stipular wings become particularly significant when we consider that *Magnolia* is so closely related to *Liriodendron*, and has several species with basilar lobed leaves. *Magnolia*, as we should naturally expect, is found in older strata than *Liriodendron* and there is no doubt of their community of descent from the same primitive form. It does not seem to me to be necessary to make any further comments on the foregoing; the figures tell the story, and no more perfect series of forms, each slightly removed from its predecessor, could be desired: in fact we are surprised to find the evolution of stipules in this genus which must have occurred in the Cretaceous period, so well portrayed and epitomized after so long an interval of time.

PASSAIC, N. J.

Studies on the Rocky Mountain Flora.—VI

By P. A. Rydberg

Salix padophylla n. n.

S. padifolia Rydb. Bull. Torr. Club, **28**: 272. 1901. Not Anderson.

In the May number of the Bulletin appeared a new species of willow under the name *S. padifolia*. The name should have been *S. padophylla*, as *S. padifolia* is preoccupied by one of Anderson's species. Besides, *padus* is originally a Greek word, *πάδος*.

Trifolium stenolobum sp. nov.

A densely cespitose and scapose perennial. Branches of the caudex covered by the large stipules which are 2 cm. long; petioles 5–10 cm. long, finely strigose; leaflets 3, narrowly lanceolate or oblanceolate, 1.5–4 cm. long, finely strigose, very acute or acuminate: scape 1–1.5 dm. long: heads many-flowered; bracts minute; flowers reflexed in fruit: calyx-tube silky-strigose, 4–5 mm. long; teeth almost filiform, 7–9 mm. long: banner about 18 mm. long, obtuse, mucronate.

This is related to *T. dasyphyllum* but is easily distinguished by the minute bracts, the long slender calyx-teeth and the larger corolla. It grows at an altitude of 3600 m.

Colorado: La Plata Mountain, 1896, *F. Tweedy, 457* (type in U. S. Nat. Herb.).

Trifolium subcaulescens A. Gray, Ives, Rep. Colo. Riv. Bot. 10. 1860

Trifolium nemorale Greene, Pittonia, **4**: 136. 1900.

Dr. Watson referred this species to *T. gymnocarpum*, to which it is nearest related, but it differs in the larger size and the many-flowered head. The specimen of C. F. Baker's no. 446 in the herbarium of the New York Botanical Garden matches perfectly Newberry's specimen in the Columbia University herbarium. The former is the type number of *T. nemorale* Greene, and the latter that of *T. subcaulescens* A. Gray. Unless the type sheets repre-

sent different species from those represented in our herbaria, Prof. Greene's name has to pass into synonymy.

Trifolium bracteolatum

Trifolium lilacinum Rydb. Bull. Torr. Club, **28**: 37. 1901. Not Greene. 1896.

Vicia producta sp. nov.

A very slender, sparingly hairy cespitose perennial. Stems decumbent or ascending, 2–3 dm. long, much branched and leafy, striate and somewhat angled: stipules narrow, semi-hastate, entire, 3–5 mm. long; leaflets 3–5 pairs, oblong to linear, 5–15 mm. long, obtuse, mucronate; tendrils 3-cleft: peduncles 2–4 cm. long, usually 2-flowered, produced beyond the upper flower: calyx-tube about 2 mm. long, strigose, teeth about 1 mm. long, lanceolate-subulate: corolla about 8 mm. long, yellowish-white, tipped and tinged with purple.

This species is probably closest related to *V. humilis* H. B. K., but is characterized by having the peduncle produced beyond the two flowers and by different calyx-lobes. The type was growing among rocks on the south side of a butte, at an altitude of about 2400 m.

COLORADO: Butte, 5 miles southwest of La Veta, 1900, *Rydberg & Vreeland, 6006*.

Primula Americana sp. nov.

Primula farinosa A. Gray, Syn. Fl. **2**[1]: 58, in part. 1878. Not L. 1753.

Perennial with a short rootstock and fleshy-fibrous roots. Basal leaves oblong or oblong-oblanceolate or spatulate, 2–8 cm. long, obtuse, gradually contracted at the base, usually with short winged petioles, sinuate dentate above the middle or subentire, thin, more or less mealy, especially on the lower surface: scape 1–2 dm. high, mealy when young: bracts 6–10 mm. long, linear-lanceolate, usually acute: pedicels in flower little if any exceeding the bracts, in fruit sometimes 2 cm. long, erect from the beginning: calyx more or less mealy, 6–8 mm. long, lobes oblong-obtuse: corolla lilac; tube 8–9 mm. long, only slightly exceeding the calyx; lobes of the corolla obcordate, 2–3 mm. long.

This species has been confused with *P. farinosa*, but I think it distinct. All specimens from the Rocky Mountain region under that name differ from the European and especially the Scandi-

navian *P. farinosa* in the longer bracts, in the longer calyx and in the short corolla lobes. The specimens of northeastern America seem to be like the European plant. In the latter the bracts are only 4–6 mm. long, acuminate, the calyx less than three fourths the length of the tube of the corolla and the lobes of the latter 4–5 mm. long. *P. Americana* grows in swamps and wet meadows of the Rocky Mountain region at an altitude of 1200–2500 m.

MONTANA: Deer Lodge, 1895, *P. A. Rydberg, 2746* (type).

WYOMING: Little Laramie River, 1896, *Aven Nelson, 1961*; Hams Fork and La Barge, 1900, *C. C. Curtis.*

ALBERTA: Devil's Head Lake, Banff, 1899, *W. C. McCalla, 2422.*

COLORADO: North Park, 1896, *Geo. E. Osterhout.*

Cuscuta gracilis sp. nov.

Stem filiform, about .25 mm. in diameter. Flowers in dense globular clusters: calyx gamosepalous but cleft to near the base, lobes ovate: corolla urceolate, less than 2 mm. high, lobes ovate, widely spreading, acute, delicate, about 1 mm. long; scales ovate, crenate, not divided, almost half as long as the corolla-tube: filaments subulate, about twice as long as the anthers: styles distinct, equal, about as long as and somewhat thicker than the red filiform curved stigmas: capsule about 2 mm. high, acute-globose, circumscissile near the base: seeds about 1 mm. long.

This species is nearest related to *C. epilinum*, which, however, has shorter and broader corolla-lobes, shorter filaments, scarcely longer than the anthers and short emarginate and crenate scales. *C. gracilis* grows parasitic on species of *Erigeron*, *Chrysothamnus* and *Solanum.*

WYOMING: Rolling plains between Sheridan and Buffalo, 1900, *F. Tweedy, 3292* (type); Laramie, 1894, *Aven Nelson, 1139.*

Cuscuta megalocarpa sp. nov.

Stem stout, usually over 1 mm. in diameter. Flowers in dense globular clusters: pedicels very short, at most 2 mm. long: calyx gamosepalous, lobes rounded, scarcely 1 mm. long: corolla about 3 mm. high and broad, lobes broadly triangular, acutish, about 1 mm. long, with incurved tip; fringed scales attached near the bottom, equalling about half the corolla-tube, deeply 2-lobed, and fringed only in the open sinuses: stamens about as long as the lobes of the corolla, filaments subulate, about twice as long as the

rounded anther: styles distinct, short, stigmas capitate: capsule 5–6 mm. in diameter, acute-globose, about 4-seeded: seeds about 2.5 mm. long and 2 mm. broad, finely muricate.

A plant parasitic on willows and other shrubs, at an altitude of about 2000 m.

COLORADO: Cucharas Creek, near La Veta, 1900, *F. K. Vreeland, 670.*

WYOMING: Dayton, Sheridan Co., 1899, *F. Tweedy, 2278.*

Monarda comata sp. nov.

Perennial with a horizontal, slender rootstock. Stem obtusely 4-angled, 4–6 dm. high, simple, sparingly silky-villous, especially below the nodes and on the upper portion: lower leaves with more or less hairy petioles, which are about 1 cm. long, the upper subsessile; blades ovate or lance-ovate, more or less cordate at the base, acute or acuminate, serrate with small teeth which are directed forward, 4–6 cm. long, sparingly silky-strigose on both sides: bracts green or tinged with purplish, ovate, 1–2 cm. long: calyx about 1 cm. long, minutely puberulent, with a ring of hairs at the base of the teeth, which are subulate, .7 mm. long: corolla red-purple, almost wine-color, densely villose-puberulent, the exserted portion about 2 cm. long.

This is nearest related to *M. stricta* Wooton, but differs in the long pubescence of the stem, leaves and bracts, shorter calyx-teeth and darker flowers. It grows in meadows among bushes, at an altitude of 2000–2500 m.

COLORADO: Wahatoya Creek, 1900, *Rydberg & Vreeland, 5673* (type); Ruxton, 1900, *Fred Clements.*

Castilleja Wyomingensis sp. nov.

A more or less cespitose perennial with a short woody caudex. Stems 3–4 dm. high, striate, sparingly puberulent and the upper portion viscid-pubescent: leaves linear, 4–5 cm. long, 4–7 mm. wide, minutely puberulent, more or less distinctly 3-nerved, entire, or the upper 3-lobed: bracts lanceolate to ovate, puberulent and ciliate on the margin and veins tinged with sulphur-yellow, 3-lobed at the apex or the lower entire, middle lobe oblong and rounded at the apex, the lateral ones lanceolate or linear, acute: calyx villose, nearly 2 cm. long and almost equalling the corolla, sulphur-yellow, cleft about half way down, slightly deeper on the lower than on the upper side, lateral cleft 3–4 mm. deep: corolla greenish, tinged and bordered with sulphur-yellow, galea about 6 mm. long, lip about 2 mm.: capsule ovoid, 12–13 mm. long.

The species is nearest related to *C. sulphurea*, from which it differs in the narrow leaves and in being more puberulent. It grows in northern Wyoming at an altitude of 2200–2700 m.

WYOMING: Big Horn Mountains, Sheridan Co., 1899, *F. Tweedy, 2341* (type) and *2342;* Headwaters of Clear Creek and Crazy Woman River, 1900, *Tweedy, 3400.*

Pentstemon suffrutescens sp. nov.

Pentstemon caespitosus var. *suffruticosus* A. Gray, Syn. Fl. **2**[1]: 270. 1878. Not *P. suffruticosus* Dougl. 1846.

Excellent specimens of what I take to be Gray's variety cited above, which was described from imperfect material, have been collected by Mr. Tweedy, and these show that the plant is nearer related to *P. pumilus* than to *P. caespitosus*, but the calyx lobes are broader, shorter and blunter than in that species, the corolla slightly smaller and the leaves glabrous.

COLORADO: Ridgway, 1895, *F. Tweedy, 170.*

Sambucus microbotrys sp. nov.

A low shrub, 5–20 dm. high, glabrous throughout and with pale green foliage. Leaflets ovate or rarely ovate-lanceolate, acute or short-acuminate, 3–9 cm. long, mostly rounded and oblique at the base, coarsely serrate: cyme thyrsoid-paniculate, small, about as long as broad, about 3 cm. in diameter and of the same height; flowers whitish: fruit bright red, 4–5 mm. in diameter: seeds finely punctate-rugose.

This species is nearest related to *S. pubens* and perhaps all specimens from the southern Rockies referred to that species belong here. The main distinctions from *S. pubens* are the total absence of pubescence and the smaller inflorescence. It grows at an altitude of 1500–2700 m.

COLORADO: Bottomless Pit, and below Halfway House, Pike's Peak, 1896, *E. A. Bessey* (type); Gray's Peak, 1895, *P. A. Rydberg;* East Indian Creek, 1900, *Rydberg & Bessey, 5582;* Little Veta Mountain, *5583.*

Chrysothamnus filifolius sp. nov.

A small shrub, about 3 dm. high, very bushy. Bark of the stems and larger branches gray and somewhat fissured, that of the young branches white and shining: leaves very narrow, linear-

filiform, 1–2 cm. long, less than 1 mm. wide, dark green and glabrous except the minutely scabrous-ciliolate margins: cyme large, flat-topped: heads very numerous, 5–6 mm. high, 2 mm. in diameter, turbinate; bracts in 5 vertical rows with usually 3 in each row, lanceolate-acuminate, the outer with green tips, the inner wholly chartaceous.

In habit and leaves, this species resembles *C. stenophyllus*, but the leaves are still narrower and in that species the bracts are obtuse or merely acute.

COLORADO: Granite, 1896, *Fred. Clements, 390.*

Chrysothamnus scoparius sp. nov.

Perennial with a woody caudex and deep tap-root. Stems 1–2 dm. high, glabrous and shining, with a white bark: leaves narrowly linear, light bluish-green, glabrous, 2–3 cm. long, a little over 1 mm. wide, more or less twisted: cyme flat-topped: heads numerous, 6–8 mm. high, 2–3 mm. wide; bracts chartaceous, lanceolate, acuminate.

This species is still more like *C. stenophyllus* in habit, but the bracts are different, being acuminate instead of obtuse or acute and more keeled. The perennial portion is also much shorter and the general color of the plant is much lighter.

COLORADO: Mesas, La Veta, 1900, *F. K. Vreeland, 698.*

Aster crassulus sp. nov.

Aster multiflorus A. Gray, Pl. Wr. **2**: 75. In part. 1853.

Aster incano-pilosus Rydb. Mem. N. Y. Bot. Gard. **1**: 393. In part. 1900.

Perennial with a horizontal, stoloniferous rootstock. Stems erect or ascending or rarely decumbent, usually simple below, branched above, 4–7 dm. high, terete, brownish, densely hirsute with short divaricate hairs: stem-leaves linear, or oblong-linear, 3–6 cm. long, 2–3 mm. wide, rather firm, hirsute with short spreading hairs, sessile and slightly clasping, in age usually reflexed, acute with a short spinulose tip; those of the branches smaller; those of the branchlets only 3–5 mm. long and merging into the bracts of the involucres: heads numerous, borne at the end of leafy branchlets which are 1–2 cm. long; involucre turbinate, 5–8 mm. high, 8–10 mm. broad; bracts in 3–4 series, the outer successively shorter, broadly spatulate, minutely spinulose-mucronate, very thick, hirsute especially on the margin, chartaceous at the base with a broadly oval herbaceous tip: rays numerous, white, 5–7 mm. long and fully 1 mm. wide: achenes strigose.

This is a member of the *A. multiflorus* group and has been confused with *A. commutatus* (T. & G.) Gray or *A. incano-pilosus* Sheldon. In *A. commutatus*, the stem is strigose-pubescent, the branchlets more elongated and the outer bracts longer than in *A. crassulus* and often equalling or surpassing the inner bracts. It may be the same as described by Lindley in Hooker's Flora and DeCandolle's Prodromus as "*A. ramulosus* β, incano-pilosus"; but here it is to be noticed that the word "incano-pilosus" is printed in the same type as all the descriptions and not the special type used for names. Hence "incano-pilosus" was a descriptive term for the *A. ramulosus* β, and not the name. If, however, it should be taken as a name, which Mr. Sheldon did, it is a *nomen nudum*, as no further description is given, and then should be disregarded. As Sheldon's *Aster incano-pilosus*, which is amply distinct, has as a synonym, the older *A. commutatus* (T. & G.) Gray it must be dropped and *A. commutatus* substituted.

A. crassulus grows on dry plains and table-land at an altitude of 1200 m.

COLORADO: Mesas, La Veta, 1900, *F. K. Vreeland, 690a* (type) and *690*; Denver, 1871, *Dr. Geo. Smith, 83;* Ridgway, 1894, *F. Tweedy, 306;* Pagosa Spring, 1899, *C. F. Baker, 637.*

NEW MEXICO: 1851, *C. Wright, 1155;* Rio Dolores, *Newberry.*

CALIFORNIA: Valley, near San Filipe, 1858, *S. Hayes.*

WYOMING: Bear Lodge Mountains, 1898, *L. W. Carter;* Moorcroft, 1897, *L. W. Carter;* Dayton, 1899, *F. Tweedy, 2031.*

NORTH DAKOTA: Minot, 1891, *Wright;* Custer, 1892, *Rydberg, 773.*

MONTANA: Park Co., 1887, *F. Tweedy, 359;* Colgate, *Sandberg, MacDougal & Heller, 1021;* Montana Valley, Madison Co., 1899, *Aven & Elias Nelson, 6839.*

Aster exiguus (Fernald)

Aster ciliatus Muhl.; Willd. Sp. Pl. **3**: 2027. 1804. Not Walt. 1788.

Aster hebecladus A. Gray, Syn. Fl. **2**[1]: 185, under *A. multiflorus*. Not DC.

Aster multiflorus var. *exiguus* Fernald, Rhodora, **1**: 187. 1899.

I think that *Aster ciliatus* Muhl. is distinct from *A. multiflorus;*

but unfortunately it is antedated by *A. ciliatus* Walt. In *A. multiflorus* the pubescence is mostly appressed and the bracts are narrow-oblanceolate and rather thin. In *A. exiguus* the pubescence is much denser and divaricate and the bracts are thick, broadly spatulate or obovate. In fact *A. exiguus* differs from the preceding only in the smaller, more crowded heads and the shorter rays; the former are less than 5 mm. high and the rays are only 5–6 mm. long. The New Mexican form which Gray regarded as *A. hebecladus* DC. and for which Dr. Greene has revived the name belongs here, but is evidently not *A. hebecladus* DC. for this is described as having glabrous stem and linear bracts.

A. exiguus grows on prairies and plains along roads, etc., and westward is much more common than *A. multiflorus*. It ranges from Vermont and Pennsylvania to Washington and south to Texas and Arizona.

Machaeranthera rubricaulis sp. nov.

Biennial or perhaps perennial. Stem erect or nearly so, simple below, branched above, 4–6 dm. high, terete, striate, usually tinged with red or purple, finely strigose-puberulent, not viscid: leaves linear or linear-oblanceolate, sessile, acute, entire or sparingly dentate, scabrous-ciliolate on the margins; the largest 8 cm. long, and 8 mm. wide: heads corymbose-cymose, numerous: involucre 10–12 mm. high, 12–15 mm. in diameter: bracts numerous, linear-lanceolate with attenuate, almost terete squarrose tips, viscid-puberulent: rays numerous, dark blue, about 12 mm. long and 1 mm. wide: pappus sordid: achenes flat, sparingly and minutely strigose.

The species grows in dry soil at an altitude of 2000–2700 m.

COLORADO: Mesas, La Veta, 1900, *F. K. Vreeland, 681* (type); Telluride, 1894, *F. Tweedy, 304* and *305*.

Erigeron laetevirens sp. nov.

Perennial with a woody tap-root. Stems several, 1.5–2 dm. high, slender, erect or ascending, striate, silky strigose: basal leaves very narrowly linear-oblanceolate, acute, 5–10 cm. long, 1–3 mm. wide, sparingly strigose; stem-leaves narrowly linear, 2–6 cm. long, scarcely over 1 mm. wide: heads solitary: involucre 12–15 mm. in diameter, grayish villous-hirsute: bracts in 2–3 series, subequal, linear-lanceolate, long-acuminate: rays numerous, blue or purple, 7–8 mm. long, 1–1.5 mm. wide.

This species is nearest related to *E. Montanensis*, from which it differs in the narrower, blue or purple rays and longer and less pubescent leaves. It grows at an altitude of 2000–2700 m.

WYOMING: Little Goose Creek, 1899, *F. Tweedy, 2005* (type); Headwaters of Clear Creek and Crazy Woman River, 1900, *3010*.

Carduus Centaureae sp. nov.

(?) *Cnicus carlinoides* var. *Americanus* A. Gray, Proc. Am. Acad. **10**: 48. 1874. Not *Cirsium acaule* var. *Americanus* A. Gray. 1863.

(?) *Cnicus Americanus* A. Gray, Proc. Am. Acad. **19**: 56.

Biennial or perennial. Stem rather slender, 6–10 cm. high, striate, often tinged with red, slightly floccose when young: basal leaves about 2 dm. long, thin-petioled, deeply pinnatifid to near the midrib, above light green, sparingly floccose when young, glabrate in age, beneath more or less permanently grayish-tomentose; lobes lanceolate or triangular, 2–4 cm. long, more or less toothed and tipped with weak spines, 1–3 mm. long; lower stem-leaves similar but petiole more winged, dilated at the base and short decurrent; the upper sessile and clasping with an auricled base; the uppermost lanceolate and undivided: heads 2–2.5 cm. high and 1.5–2 cm. in diameter: outer bracts narrowly lanceolate, yellowish, often with darker center, fimbriate on the margin and tipped with a flat weak spine 1–2 mm. long: the inner with dilated deltoid scarious fimbriate tips which are merely acuminate: flowers ochroleucous.

This species may be the *Cnicus Americanus* A. Gray or *Carduus Americanus* Greene, but the name *Americanus* is preoccupied. The species is, however, not nearest related to *C. Parryi*, where Dr. Gray placed it; but to *C. leiocephalus* and *C. canovirens*, from which it differs in the less spinose, more dilated and fimbriate bracts. A seedling of apparently this species was collected by Cowen and it has long oblanceolate 3–4 dm. long, undivided leaves. It grows at an altitude of 2200–2600 m.

COLORADO: Laramie County, 1895, *J. H. Cowen* (type); 4-mile Hill, Routt County, 1896, *C. F. Baker;* Penn's Gulch, 1865, *Letterman, 78*.

Carduus erosus sp. nov.

Biennial. Stem stout, about 7 dm. high, angled and striate, often red, loosely floccose when young: lower leaves about 2 dm. long, rather thin, green and slightly floccose above when young:

grayish-tomentose beneath, deeply pinnatifid to about one fourth from the midrib: lobes about 2 cm. long, lanceolate, few toothed or lobed and tipped with moderately strong spines 4–10 mm. long: heads hemispherical, 2.5–3 cm. high and 2.5–3.5 cm. broad: outer bracts ovate, slightly floccose when young, entire, with a narrow dorsal line, tipped with weak spines 1–2 mm. long, the inner with dilated deltoid erose scarious acuminate tips: flowers ochroleucous.

A species closely related to the preceding, differing in the larger heads, longer spines, broader bracts and with erose instead of fimbriate tips. It grows in moist meadows at an altitude of about 2200 m.

COLORADO: Durango, 1896, *Frank Tweedy, 517* (type in U. S. Nat. Herb.).

Carduus Americanus (A. Gray).

Cirsium acule var. *Americanus* A. Gray, Proc. Acad. Phila. 1863: 68.

Cnicus Drummondii acaulescens A. Gray, Proc. Am. Acad. **10**: 40, in part.

Dr. Gray's *Cirsium acaule* var. *Americanum* is amply distinct from *C. Drummondii* not only by the acaulescent habit, but also by the narrower bracts and their long stout spines which are 1–2 cm. long while in *C. Drummondii* they are only a few mm. in length and very weak. It is an alpine species growing at an altitude of 2800–3500 m. To this belong the following specimens.

COLORADO: Silver Plume, 1895, *P. A. Rydberg;* Como, South Park, 1895, *C. S. Crandall;* South Park, 1884, *Letterman.*

Carduus acaulescens (A. Gray)

Cnicus Drummondii var. *acaulescens* A. Gray, Proc. Am. Acad. **10**: 40, in part.

Gray's variety *acaulescens* was based on two previously published things, viz., *Cirsium acaule* var. *Americanus* A. Gray, given above, and *Cirsium Drummondii*, "acaulescent form" D. C. Eaton in King's Report. As the first already has a valid name, I here adopt the name *acaulescens* for the other part on which the variety was founded. *C. acaulescens* resembles closely *C. Americanus* in habit, but the spines of the outer and middle bracts are shorter and

weaker, seldom over 5 mm. long, and the inner are acuminate, wholly unarmed. The true *C. Drummondii*, even in its subacaulescent state, has very broadly ovate outer bracts and the spine is so fine that it is better called a bristle. The inner bracts have a long acuminate very crisp tip. In *C. acaulescens* it is scarcely crisped. The following specimens belong to *C. acaulescens*:

UTAH: Bear River Valley, 1869, *S. Watson, 690.*

WYOMING: Woods Creek, 1897, *Aven Nelson, 3483.*

COLORADO: Grizzly Creek, 1896, *C. F. Baker.*

Carduus oreophilus sp. nov.

Cirsium Drummondii, D. C. Eaton, King's Rep. **5**: 195. 1871. Not T. and G.

Biennial stem 4–8 dm. high stout, angled and striate, slightly arachnoid-hairy when young, leafy: basal leaves about 2 dm. long, thin, short-petioled, green and glabrate above, more or less grayish-tomentose beneath, pinnately lobed a little more than half way to the midrib; lobes triangular, usually 2–3-lobed, with rather slender spines 3–10 mm. long: heads hemispherical, 2–2.5 cm. high, 2.5 cm. broad: outer and middle bracts narrowly lanceolate, slightly arachnoid, tipped with flat spines 3–6 mm. long, the inner with a long attenuate soft tip: flowers red.

This species has been included in *C. Drummondii* but is taller with smaller head, narrower bracts, the outer with longer spines, and the tips of the inner scarcely crisp. It grows at an altitude of 1500–3000 m.

COLORADO: Georgetown, 1895, *P. A. Rydberg* (type); Pagosa Springs, 1899, *C. F. Baker, 644.*

NEVADA: Run Valley, 1868, *S. Watson, 689.*

Caduus griseus sp. nov.

Biennial. Stem stout, sparingly floccose when young, angled and striate: basal leaves oblanceolate in outline, thin, glabrate above, grayish-tomentose beneath, deeply pinnately divided; segments 3–4 cm. long, deeply 2–3-lobed and toothed, tipped and margined with rather slender spines 3–5 mm. long; the upper similar but less deeply divided, sessile and half clasping by the dilated rounded shortly decurrent base: heads about 3 cm. high and broad: bracts subequal, without dorsal glandular ridge, the outer narrowly lanceolate, with a long-attenuate tip gradually changing into a flat spine, and somewhat laciniate or spinulose-

dentate on the margin; the inner bracts less rigid, their tips not spinose but long-attenuate, scarious and somewhat crisp: flowers ochroleucous.

This species is probably nearest related to *C. leiocephalus* (D. C. Eaton) Heller but differs in the less divided, less spinose leaves and the bracts which are lacking the long yellow spines on the margins. *C. leiocephalus* has red flowers. *Carduus griseus* grows at an altitude of 3400 m.

COLORADO: Telluride, 1894, *F. Tweedy, 321* (type in U. S. Nat. Herb.).

Carduus pulcherrimus sp. nov.

Biennial. Stem about 4 dm. high, very leafy, grayish-tomentose, especially when young, angled: lower leaves 1–1.5 dm. long, oblanceolate in outline, short-petioled, pinnately divided, bright green and glabrate above, densely white-tomentose beneath; segments lanceolate or triangular, lobed and toothed with slender spines 3–5 mm. long; the upper leaves similar, sessile and half clasping: heads 2.5–3 cm. high, 2.5–4 cm. broad: outer bracts lanceolate with a narrow glandular ridge, slightly floccose, tipped with yellow spines about 5–7 mm long; the innermost narrowly lanceolate and with long-attenuate tips: flowers rose-colored.

In habit this species resembles most *S. undulatus* and *S. ochrocentrus*, but has smaller heads, narrower bracts and narrower glandular ridge. It is perhaps intermediate between those species and *C. canovirens*, from which latter it is easily distinguished by the dense tomentum on the lower surface of the leaves. It grows in open woods, etc., at an altitude of about 2500 m.

WYOMING: Headwaters of Clear Creek and Crazy Woman River, 1900, *F. Tweedy, 3048* (type); Medicine Bow, 1898, *Elias Nelson, 4396*.

Carduus oblanceolatus sp. nov.

Apparently perennial. Stem rather slender, 3–6 dm. high, almost terete, densely white-tomentose: lower leaves about 1 dm. long, oblanceolate, thick, short-petioled, merely spinulose-dentate or rarely with a few triangular lobes, loosely floccose above, densely white-tomentose beneath, spines slender, 2–5 mm. long; upper leaves lanceolate, sessile and half clasping: heads 1–3, campanulate, 3–3.5 cm. high, 1.5–2.5 cm. broad: bracts slightly floccose at first, with a narrow glandular dorsal ridge, the outer ovate-lanceolate, the middle lanceolate, with a slender divergent spine,

3–5 mm. long, the innermost long-attenuate, unarmed: flowers rose-colored.

This species is nearest related to *C. Flodmanii*, differing in the more simple habit, the smaller, thicker, not pinnatifid leaves and shorter and weaker spines. From *C. altissimus* it differs in the denser tomentum, the simple habit, the narrower and fewer bracts and their narrower dorsal ridges.

COLORADO: Twin Lakes, 1896, *Fred. Clements, 385* (type).

Agoseris arachnoidea sp. nov.

Perennial with a tap-root, more or less floccose throughout. Leaves 1.5–2 dm. long, more or less runcinate-lobed, oblanceolate in outline, long-attenuate at the apex, densely floccose when young, more glabrate in age: scape 1.5–4 dm. high, densely woolly above, less so below: head 2–2.5 cm. high, 1.5–2 cm. broad: bracts in about 3 series, linear-lanceolate, long-attenuate, the inner one-third longer than the outer: flowers at least in age rose-purple: beak of the achenes fully as long as the body.

Perhaps nearest related to *A. aurantiaca* but differing in the larger heads, the dense pubescence and the lighter flowers. It grows in meadows at an altitude of 2000–2800 m.

COLORADO: Gray-Back Mining Camp, 1900, *Rydberg & Vreeland, 5553* (type); La Veta, 1896, *Fred. Clements, 167*.

Agoseris pubescens sp. nov.

Perennial with a tap-root and short branching caudex. Leaves narrowly oblanceolate, about 1 dm. long, .5–1 cm. wide, acuminate, slightly glaucous but even in age villous-pubescent: scape 1.5–2 dm. high, sparingly villous: involucre about 2 cm. high and 1.5 cm. wide, villous and somewhat viscid: bracts with a dark median line and sometimes tinged with purple, the outer ones ovate-lanceolate, about ⅔ the length of the linear-lanceolate long-acuminate inner ones: flowers lemon-yellow, the outer striate or tinged with purple: beaks of the achenes short and striate throughout.

This species is nearest related to *A. glauca* and *A. scorzonerae-folia* but differs in being very pubescent. It grows in moist meadows at an altitude of 2000–2500 m.

WYOMING: Big Horn Mountains, Sheridan County, 1899, *F. Tweedy, 2055* (type); Buffalo Fork, 1897, *578*; Amethyst Creek, 1899, *Aven & Elias Nelson, 5769* (in part).

Taraxacum Alaskanum sp. nov.

A low delicate plant with perennial root: leaves linear-oblanceolate in outline, 3–5 cm. long, deeply runcinate-pinnatifid with triangular retrorse lobes: scape 4–5 cm. high: involucre campanuate, 10–12 mm. high, 6–8 mm. broad: bracts fuscous, not corniculate; the inner linear-lanceolate, long-acuminate; the outer scarcely half as long, lanceolate, spreading or somewhat reflexed: achenes brownish, spinulose-muricate above, fusiform, 4 mm. long.

This in size and habit most resembles *T. scopulorum*, but is easily distinguished by its triangular acute lobes. It was found "on steep side bank facing the ocean."

ALASKA: Pt. Barrow, 1898, *McIlhenny*.

Crepis glaucella sp. nov.

Perennial with a slender tap-root. Stem slender, about 3 dm. high, glabrous and shining: basal leaves glabrous and shining, somewhat glaucous, thin, 5–10 cm. long; blades oblanceolate, acute at the apex, tapering downward into a more or less winged petiole, remotely sinuate-dentate with divaricate or retrorse short teeth or entire; stem-leaves 1–2, much reduced, 1–2 cm. long, linear or nearly so: heads 1–4, on slender branches: involucre turbinate, about 1 cm. high and 6–8 mm. wide, sparingly hirsute; bracts linear-lanceolate, acuminate: achenes brown, 10-striate, glabrous: pappus white.

This species is nearest related to *C. glauca* but differs in the smaller, narrower, longer-petioled leaves and hirsute involucre.

WYOMING: Pacific Creek, 1897, *F. Tweedy*, *603*.

HIERACIUM MACRANTHUM Nutt. Trans. Am. Phil. Soc. II. **7**: 446. 1840

Hieracium umbellatum Hook. Fl. Bor. Am. **1**: 300, in part; Rydb. Mem. N. Y. Bot. Garden **1**: 463, mainly. Not L.

The plant of the Rocky Mountain region which has been referred to *H. umbellatum* and sometimes to *H. Canadense* is quite distinct from both. The leaves are usually broader than in the first but narrower than in the second and the heads are usually fewer than in either. The best character by which to distinguish it is, however, the pubescence. The leaves are densely puberulent and decidedly scabrous-ciliolate on the margins. The upper portion of the stem and the branches of the inflorescence are also scabrous-puberulent.

H. macranthum ranges from Wyoming and Washington northward to subarctic America. It apparently also extends eastward to the upper Mississippi River (Nicollet's specimens seem to belong here) and therefore may be Schweinitz' *H. scaberrimum*, which has been referred to *H. umbellatum* and *H. Canadense*. I have not seen Schweinitz' original description and can not venture an opinion. Nuttall's name belongs to the plant without any doubt.

Hieracium Columbianum sp. nov.

Perennial. Stem about 6 dm. high, terete, more or less tinged with purple, more or less white- or yellowish-hirsute below, glabrous or puberulent above : lower leaves oblanceolate, 8–10 cm. long, light green and somewhat glaucous beneath, usually more or less silky-hirsute, sinuately dentate, acute ; the middle leaves lanceolate or ovate-lanceolate with rounded or obtuse base, sessile, more glabrate ; the uppermost much reduced and bract-like : inflorescence corymbose-cymose, small and contracted : heads 2–6, 12–15 mm. high : bracts lanceolate, unequal and more or less imbricated, dark, puberulent when young, glabrous in age : pappus very light brownish.

This species is nearly related to *H. Canadense* and *H. umbellatum*, but differs from both in the long hairs of the lower part of the plant. The leaves are thin as in *H. Canadense* but narrower and the heads are fewer. It grows in low ground at an altitude of about 600 m.

IDAHO : Priest River Valley, 1900, *D. T. MacDougal*, *109* (type) ; cañons near Farmington Landing, 1892, *Sandberg*, *MacDougal* & *Heller*, *573*.

Still further Notes on the Agrimonies

By Eugene P. Bicknell

It so happens that only now, some months after its publication, have I read in this journal Dr. Robinson's defense of his expressed views as to the names which should be used in our group of agrimonies. Lest silence should be taken as giving assent, some further words may here be said touching the nomenclatorial disturbance which has developed around these modest plants. Let not the time-honored name of their genus bear any such irreverent modification as one of our British friends has ventured to suggest (James Britten, Journal of Botany, **39**: 152). It is not easy to discern any important reason why the discussion should be modeled too sharply after a salient character of the plants themselves which, after all, are provided with hooked prickles only in the beneficent way of nature. The third paper of the discussion is stripped of all such armament and the reply it must elicit here gladly follows its graceful lead. Nevertheless, a wide divergence of view on the points at issue must still be expressed.

Happily, the number of propositions at first in dispute are already reduced since he has frankly admitted that the names newly adopted for two of our species were incorrectly taken up.* But it should not be left unsaid that the names since adopted for these mistakenly substituted ones are equally ineligible for current use inasmuch as they cannot justly be made to supplant the names by which the plants in question were earlier distinguished.

The matters remaining in dispute are primarily these: (1) The right application of the name *Agrimonia striata* Michx. (2) The identity of *A. Brittoniana* with *A. pilosa* Ledeb. (3) The identity of *A. hirsuta* Muhl. (4) The status of distinctive names of species first used in a varietal sense.

1. Dr. Robinson argues that the *A. striata* Michx. is the same as my *A. Brittoniana*, basing his contention on the orig-

* *Agrimonia platycarpa* Wallr. for *A. mollis* Britton, and *A. microcarpa* Wallr. for *A. striata* Michx. (*A. glabra* Muhl.).

inal description of the plant and on one of the specimens on the existing sheet of *A. striata* in the Michaux herbarium. Of the original description it may at once be said that it applies better to *A. Brittoniana* than to any other one of our species. A moment's thought, however, will show that this essential agreement is in itself quite inconclusive. If there were no such plant as *A. Brittoniana* the description would unquestionably be held to apply with sufficient exactness to several of our species and, as a matter of fact, was so held during the long period within which *A. Brittoniana* remained undistinguished. The description is, in fact, almost generic, and specimens of *A. hirsuta* (Muhl.), *A. glabra* (Muhl.) and *A. mollis* Britton may be compared character by character with the description and be found to come sufficiently within it. It cannot be claimed therefore that Michaux's description is in itself so thorough-going as to exclude all but a single one of several critically similar species. But even assuming that it was principally derived from a specimen of the plant now known as *A. Brittoniana*, Michaux's name would still be unavailable.

The existing sheet of *A. striata* in the Michaux herbarium at Paris shows that the species as originally put forth was a composite one. Upon the sheet are two distinct plants both labeled *A. striata*, one being *A. Brittoniana*, the other *A. glabra* (Muhl.). It is, of course, well-established practice that the first critical student of a mixed species has the privilege of restricting the original name and applying it definitively to either of the two or more component plants. In this case of the composite *A. striata* Michx. this was long ago done, and in no uncertain way, by Dr. Gray. The name *A. striata* was thus carefully limited by him to that part of the original *A. striata* later distinguished by Muhlenberg as *A. Eupatoria glabra*. I cannot see how this long-standing disposition of the matter can now be reversed, even though the balance of probabilities—certainties in this case are now quite beyond our reach—should favor the view that, possibly with better reason, Dr. Gray might have restricted the name *A. striata* to that one of the component specimens other than the one he chose. For his own reasons which may well have been, and doubtless were, better than we can now know, he did so limit the name, at his right was, and in unmistakable terms. Other material of which we now

know nothing may well have been available to him at that time to influence his determination, at any rate any amount of argument as to what might, could, would or should have been done can be of no avail as against what actually was done, and on matters of that kind we may well hesitate to attack the wisdom of Dr. Gray.

In attempting to correlate an actual specimen of a plant with a written description there is always a very natural tendency to read into the words of the description the particular characters of the specimen seeking determination. Descriptive terms must necessarily be more or less elastic owing to the great variability in the characters of organic beings and it is well, therefore, always to guard against a too formal understanding of such terms or to attach to them an adequacy which nature itself is certain to repudiate. It follows that a very brief description of a plant which may be quite sufficient in the case of a monotypic species is very apt to be found to be little more than generic if the species finally proves to be only one of a closely related group. The description of *A. striata* Michx. is, as already shown, a case in point. Contrariwise, in the case of the plant *A. glabra* (Muhl.) which forms part of the type of *A. striata* Michx., it will not do to insist too strongly on the character of "globular fruit," a term which wholly fails to cover the great variability in the fruit of this species. At full maturity its fruit is often perfectly graduated to the base—fairly turbinate on a not too narrow understanding of that term—which may on may not be somewhat curved, the very character from which Wallroth derived the specific name *rostellata*. So, too, the fruit becomes definitely reflexed, if less conspicuously so than in *A. Brittoniana*, and in some of its variations may well be described as sulcate and crowned by the bristles just as is called for by Michaux's description. It may be said further that *A. Brittoniana* is by no means always so sharply distinguished in its characters as to be readily separable from specimens of *A. hirsuta* or *A. mollis*, and specimens occur which need careful discrimination in order to be confidently distinguished.

In discussing *A. Brittoniana* Dr. Robinson has more than once referred to the "first mentioned type," a phrase absolutely without meaning when applied to a species of which an exclusive type has been set apart. It so happens that the plant thus referred to was

somewhat ambiguous and took first place in the list of specimens examined only for the purpose of showing continuity in the range indicated.

2. It is, of course, quite possible that Dr. Robinson may be right in his contention that my *A. Brittoniana* is identical with the *A. pilosa* Ledeb. of Continental Europe, but his later reference to the matter seems to imply some recession from his earlier confidence in his position, and to my own mind the balance of probabilities is quite against this view. It is clear that the question must remain an open one subject to final settlement only by further critical study.

3. I have already given in detail the reasons which establish conclusively the identity of Muhlenberg's *A. Eupatoria hirsuta*. These reasons are made to appear all the more cogent from Dr. Robinson's later support of his dissenting view which finally rests alone on the purely fanciful supposition that the plant may have been a more hairy form of his *A. Eupatoria glabra*. The latter species does indeed, in rare cases, become somewhat hairy, but to suppose that this unusual state of the plant was regarded by Muhlenberg as its primary type is wholly untenable. Moreover *A. glabra* never approaches in hairiness the true *A. Eupatoria* of which Muhlenberg's *hirsuta* is made a variety. It is absurdly beyond reason to contend that so astute a botanist as Muhlenberg would make a variety *hirsuta* of a plant far less hairy than its parent type.

The essential thing in regard to Muhlenberg's *A. Eupatoria hirsuta* is that it recognizes the capital fact that the common American plant, by Muhlenberg so considered, was distinct from the European. For the purpose of the present use of Muhlenberg's name it matters not at all whether its original use was for a particular one of several species, as we have since learned to understand them, or was more general in its application. The name was given to confer a merited distinction on a common American plant, whether exclusively or only in part to the particular species to which I have restricted it, is not of the least present consequence.

The position that a distinctive name for a new species, because first used as a varietal designation, should be denied any future

recognition, involves a disregard of the simplest principles of justice that, in the nature of the case, can never receive any right following. That a moral principle should fall because of inconvenience in applying it, is a proposition hopelessly shut out from any justification. The moral flaw would instantly appear if in to-day's practice a plant described by one author as a variety should be by a promptly succeeding author claimed as a species under a different name. Even on the most irresponsible utilitarian grounds it may be seriously doubted whether the advantages claimed for the practice advocated would not be far outweighed by its subversion of much accepted nomenclature.

In conclusion it may be reiterated that, in the course of this discussion, nothing has been brought forward which at all justifies the displacement of any of the names adopted in my review of the American species of this troublesome genus.

Dacryopsis Ellisiana Massee

By George Massee

In Mr. Durand's interesting researches on the genus *Holwaya* Sacc., which appeared in the June number of this journal, the author has clearly proved that *Holwaya gigantea* Durand has a conidial form. This conidial form Durand calls *Coryne Ellisii* Berk.

Some years ago I gave a full diagnosis * of *Coryne Ellisii* Berk., drawn up from the type specimen, and discovering that it was a Basidiomycete, named it *Dacryopsis Ellisiana.*

Arguing from the material Durand supposed to be *Coryne Ellisii* Berk., this author remarks as follows: "The matter was further greatly complicated when Massee, in 1894, described the type of *Coryne Ellisii*, making it one of the types of a new genus of the Basidiomycetes, called *Dacryopsis.*"

I have again examined Berkeley's type and find that my previous description is correct. The plant resembles a little stout-handled drumstick. The head for some time consists of very slender conidiophores bearing very minute conidia; at a later stage bifurcate basidia also appear in the head.

The explanation is quite simple. The *Coryne Ellisii* of Durand is not the *Coryne Ellisii* of Berkeley. Why Durand has made such a mistake I am not able to say. The type specimen of *Coryne Ellisii* Berk. is in excellent condition, and I have sent a fragment of it to Mr. Durand.

I observe that the specimen in Ellis, N. Amer. Fung. 1383, called "*Coryne Ellisii* Berk. (=*Stilbum giganteum* Pk.)," although superficially resembling *Coryne Ellisii* Berk., is in reality a very different fungus, and probably illustrates what Durand has been dealing with and who, like Burt in his paper, "Is there a Basidiomycetous stage in the life history of some Ascomycetes," had been misled by accepting the specimen in the exsiccati quoted above as representing the species described by Berkeley.

The above account illustrates the value of a type-specimen, *i. e.*, the actual specimen on which the species was founded, and not another specimen supposed to represent the same species. It urther illustrates the advisability of being quite certain about your species before venturing to indicate mistakes made by others.

* Jour. Myc. 6: 181, *pl. 7. f. 19–21.* 1891.

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